Claims:

1 A method for measuring loop resistance comprising:

injecting into the loop through an inductive injection probe a sinusoidal drive signal at a given frequency to produce a predetermined current in the loop;

measuring, by a test probe also inductively coupled to the loop, the true RMS drive signal voltage and induced current; and

calculating the loop resistance from the measured RMS values.

2 A method according to claim1, in which the given frequency is of the order of 1 kHz.

3 A method according to claim 1 or claim 2, in which the sinusoidal signal is generated by a microcontroller using a digital to analogue converter.

4 A method according to claim 3, in which the converter is configured to convert a microcontroller generated 0 – 10V signal to an output voltage in the range 0 200V.

5 A method according to claim 3 or claim 4, in which the output voltage is supplied to the injection probe through audio amplifier means.

6 A method according to any one of claims 1 to 5, in which drive signal voltage and induced current are measured using a multimeter arrangement.

7 A method according to any one of claims 1 to 6, in which current is measured across a burden resistor.

8 A method according to claim 7, in which the burden resistor has a value of 10Ω.

9 A method according to any one of claims 1 to 8, in which the injection and test probes have a turns ratio of 1000:1.

10 A method according to any one of claims 1 to 9, in which measurements are made to a resolution of 5½ digits or 21 bits.

11 A method according to any one of claims 1 to 10, in which the measured signals are digitally filtered to accept only the given frequency.

12 Apparatus for measuring loop resistance, comprising:

sinusoidal drive signal generating means generating a sinusoidal drive signal at a given frequency;

an inductive injection probe adapted to inject said sinusoidal drive signal into the loop;

an inductive test probe adapted to measure the true RMS drive signal voltage and induced current; and

calculating means for calculating the loop resistance from the measured RMS values.

13 Apparatus according to claim 12, in which the drive signal generating means generates a drive signal above 200 Hz.

14 Apparatus according to 12 or claim 13, in which the drive signal generating means generates a drive signal at a frequency of the order of 1 kHz.

15 Apparatus according to any one of claims 12 to 14, in which the drive signal generating means comprise a microcontroller with a digital to analogue converter.

16 Apparatus according to claim 15, in which the digital to analogue converter is configured to convert a 0 – 10V signal to an output voltage in the range 0 – 200V.

17 Apparatus according to any one of claims 12 to 16, comprising audio amplifier means connected to supply the injection probe.

18 Apparatus according to any one of claims 12 to 17, incorporating a multimeter for measuring drive voltage and/or induced current.

19 Apparatus according to any one of claims 12 to 18, including a burden resistor across which induced current is measured.

20 Apparatus according to claim 19, in which the burden resistor has a value of 10Ω.

21 Apparatus according to any one of claims 12 to 20, in which the injection and test probes have a turns ratio of between 500:1 and 2000:1.

22 Apparatus according to claim 21, in which the injection and test probes have a turns ratio of 1000:1.

23 Apparatus according to any one of claims 12 to 22, comprising a digital filter to filter the signals to accept only the given frequency.

24 A method for providing a reference loop of accurately known resistance, comprising the steps of:

making a loop of nominal resistance; and

measuring the loop resistance by:

making electrical contact with said loop at a first contact position;

making electrical contact with said loop at a second position approximately 180° around said loop; and

measuring the resistance of said loop between the contacts;

altering the position of the second contact point until the measured resistance is a maximum, and;

calculating the loop resistance to be four times the maximum measured resistance.

25 A method according to claim 24, in which the resistance is measured in a Wheatstone bridge arrangement.

26 A method according to claim 24 or claim 25, in which the loop has sub-loops facilitating fractional loop resistances.

27 A reference loop of accurately known loop resistance made by a method according to any one of claims 25 to 27.

28 A multi-value reference loop of known loop resistance having at least one sub-loop facilitating measurement of fractional loop resistance by providing more than one current path through an injection probe and/or a test probe.